INDOOR AIR QUALITY ASSESSMENT

North Quincy High School
316 Hancock Street
Quincy, Massachusetts

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
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Background/Introduction

At the request of a parent, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA), provided assistance and consultation regarding indoor air quality concerns at North Quincy High School (NQHS), 316 Hancock Street, Quincy, Massachusetts.

On January 30 and February 1, 2002, visits were made to NQHS by staff from BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) Program. BEHA staff were accompanied by Cindy DeCristofaro, Quincy Health Department, James Wilson, Director of Plant Facilities for the Quincy School Department, and Glen Oriole, Senior Custodian, NQHS, during portions of the assessment.

The school is a four story brick building constructed in 1926. An addition was constructed in 1980. The school houses grades 9-12 and also contains an early childhood center for pre-school children. The first floor is primarily made up of special-use rooms/areas such as the cafeteria and kitchen, industrial arts, the gymnasium, the auditorium and the early childcare center. The second floor consists of general classrooms, art rooms, main administrative offices and the media center. The third floor is predominantly composed of general-use classrooms and the fourth floor contains science classrooms/labs, the chemical storage area, and general-use classrooms.

Methods

Air tests for carbon monoxide, carbon dioxide, temperature and relative humidity were taken with the TSI, Q-Trak, IAQ Monitor, Model 8551. Screening for total volatile organic compounds (TVOCs) was conducted using an HNu Systems, Photo Ionization

Detector (PID) equipped with a 10.6 (eV) electronic volt lamp used to detect VOCs with an ionization potential less than or equal to 10.6 (eV). Tests for TVOCs were taken at several locations inside the building believed to be impacted by odors, and outdoors for comparison to indoor levels.

Results

This school has a student population of over 1,300 and a staff of approximately 150. Tests were taken during normal operations at the school and results appear in Tables 1-30.

Discussion

It can be seen from the tables that carbon dioxide levels were elevated above 800 parts per million parts of air (ppm) in seventy out of one hundred nineteen areas surveyed on January 31, and in twenty-six out of forty-seven areas surveyed on February 1, indicating a ventilation problem in these areas of the school. It is important to note that a large number of classrooms had open windows during the assessment, which can greatly contribute to reduced carbon dioxide levels.

Fresh air in exterior classrooms is supplied by a unit ventilator (univent) system. Univents draw air from outdoors through a fresh air intake located on the exterior walls of the building and return air through an air intake located at the base of each unit (see Figure 1). Fresh and return air are mixed, filtered, heated and provided to classrooms through a fresh air diffuser located in the top of the unit. Univents were found turned off in classrooms throughout the school. Obstructions to airflow, such as papers and books

stored on univents and bookcases, carts and desks in front of univent returns were seen in a number of classrooms (see Picture 1). In order for univents to provide fresh air as designed, intakes must remain free of obstructions but most importantly; these units must remain "on" and allowed to operate while the rooms are occupied.

Fresh air in interior classrooms is provided by rooftop motorized fresh air intakes that are connected by ductwork to ceiling-mounted supply vents. These motorized fans draw fresh air into the intakes and distribute air into ductwork connected to the classroom vent. The rooftop motorized fresh air intakes act in concert with the supply vents to provide fresh air to interior classrooms.

Several rooftop air-handling units (AHUs) exist. These AHUs are connected by ductwork to large areas such as the library, cafeteria and science classrooms. AHUs should both draw fresh air into the intake hood and exhaust stale air from the return vent. Several of the AHUs were found to be drawing outdoor air into exhaust vents, which can indicate that louvers directing return air to these vents are either missing or inoperative.

Exhaust ventilation in classrooms with univents is provided by a mechanical system. The exhaust system in each classroom consists of ducted, grated wall vents. Exhaust ventilation operates continuously in exterior classrooms. In interior classrooms the exhaust ventilation is activated by a thermostat. One exhaust vent in the library was blocked by a desk. In order for exhaust ventilation to function as designed, vents must remain free of obstructions.

The school store is located in a room that has been subdivided. The univent in the store is divided from the exhaust vent by floor to ceiling walls, which form an office and

storeroom. This configuration does not provide exhaust ventilation for the main store area.

In order to have proper ventilation with a univent and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air from the room. According to school department officials, the date of the last balancing of these systems was not available at the time of the assessment. It is recommended that existing ventilation systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994).

The Massachusetts Building Code requires a minimum ventilation rate of 15 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows in each room (SBBRS, 1997; BOCA, 1993). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week based on a time weighted average (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches. For more information on carbon dioxide see Appendix I.

Temperature readings ranged from 69° F to 77° F on January 31, and between 65° F and 75° F on February 1. These temperature ranges were mostly within the BEHA recommended range for comfort. The BEHA recommends that indoor air temperatures be maintained in a range of 70 ° F to 78 ° F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply. While temperature readings outside the recommended range are generally not a health concern, increased temperature can affect the relative humidity in a building.

The relative humidity in this building was below the BEHA recommended comfort range in most areas sampled. Relative humidity measurements ranged from twenty-nine to forty-eight percent on January 31, and from twenty-nine to forty percent on February 1. The BEHA recommends that indoor air relative humidity is comfortable in a range of forty to sixty percent. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Microbial/Moisture Concerns

A number of classrooms have water-damaged ceiling tiles which can indicate leaks from either the roof or plumbing system. Water-damaged ceiling tiles can provide a source of mold and should be replaced after a water leak is discovered and repaired. Signs of efflorescence (i.e. mineral deposits) were noted around windowsills. Efflorescence is caused by water penetration around window frames, dissolving minerals within building materials as it flows through. The water evaporates leaving a dry white residue known as efflorescence.

Several classrooms contained a number of plants, some of which were located on top of univents (see Picture 2). Plant soil and drip pans can serve as sources of mold growth. Plants should also be located away from univents and exhaust ventilation to prevent aerosolization of dirt, pollen or mold. Several rooms contained aquariums. Aquariums should be properly cleaned/maintained to prevent microbial growth and nuisance odors.

Other Concerns

A number of other conditions that can potentially affect indoor air quality were identified. Several areas had open utility holes and/or missing/dislodged ceiling tiles. Open utility holes can provide a means of egress for odors, fumes, dusts and vapors between rooms and floors. The missing/dislodged ceiling tiles can introduce dirt, dust and particulate matter into occupied areas of the school. These materials can be irritating to certain individuals.

The main office and teachers' lounges have photocopiers. Volatile organic compounds (VOCs) and ozone can be produced by photocopiers, particularly if the equipment is older and in frequent use. Ozone is a respiratory irritant (Schmidt Etkin, D., 1992). School personnel should ensure that local exhaust ventilation is activated while equipment is in use to help reduce excess heat and odors in these areas.

Accumulated chalk dust was noted in several classrooms. Chalk dust is a fine particulate, which can be easily aerosolized and is an eye and respiratory irritant. Several classrooms contained dry erase boards and dry erase markers. Materials such as dry erase markers and dry erase board cleaners may contain volatile organic compounds (VOCs), (e.g., methyl isobutyl ketone, n-butyl acetate and butyl-cellusolve) (Sanford, 1999), which can be irritating to the eyes, nose and throat.

The odor of cigarette smoke was noted in several restrooms and in stairwell 10 at the exit door. Environmental tobacco smoke can have a marked effect on indoor air quality. Environmental tobacco smoke is an indoor air pollutant, a respiratory irritant and can exacerbate the frequency and severity of symptoms in asthmatics. The most effective method of preventing exposure to environmental tobacco smoke is to have smoke free buildings. M.G.L. Chapter 270, Sec. 22 prohibits smoking in public buildings, except in an area, which has been specifically designed as a smoking area (M.G.L., 1987).

Also of note was the amount of materials stored inside some rooms (see Pictures 3 & 4). In various locations throughout the school, items were seen piled on windowsills, tabletops, counters, bookcases and desks. The large amount of items stored in classrooms provides a means for dusts, dirt and other potential respiratory irritants to accumulate. These items, (e.g., papers, folders, boxes, etc.) also make it difficult for custodial staff to

clean. Dust can be irritating to the eyes, nose and respiratory tract. These items should be relocated and/or cleaned periodically to avoid excessive dust build up.

Chemical storage

Several additional conditions were noted during this assessment, which can affect indoor air quality. There is a chemical storage area, which consists of two rooms (the inner and outer storerooms) located between classrooms 411 and 413. A number of storage conditions in these chemical storerooms can influence indoor air quality within these rooms and in immediately adjacent classrooms. The inner storeroom contains several storage containers, which include three metal cabinets (see Picture 5), a large wall-mounted wooden storage unit, a freestanding wooden storage unit in the center of the room and a refrigerator. A partial list of chemicals in this area is included in Tables 22 through 29. The following conditions were noted in the inner storeroom:

- Of prime concern was the presence of a container of ethyl ether stored in the refrigerator (see Picture 6). The Quincy Fire Department arrived on scene the day of February 1, 2002 and cordoned off the chemical storeroom. As reported by school officials, the Massachusetts State Police Bomb Squad detonated these materials in the school parking lot after hours.
- The freestanding wooden storage cabinet consists of two units that are mounted back-to-back. Each unit consists of open shelves above a counter. Below the counter are drawers and a large cabinet sealed with a wooden door. The cabinet facing away from the door contained a glass jar containing a liquid, in which a substantial amount of silvery metal is stored. The plastic lid of this container was distended, indicating

possible exposure to volatile organic solvents. This jar is labeled by hand with the words "sodium in xylene" (see Picture 7). The outside of the food jar appeared to be coated with an unidentified material. Xylene is a material in a class of chemicals called volatile organic compounds. In order to determine whether xylene was off-gassing from this container, measurements for volatile organic compounds were measured within the cabinet. A reading of 128 ppm of TVOCs was measured in the cabinet, which indicates that materials are likely off-gassing from the jar. TVOCs measured in the center of the storeroom and adjacent hallway were equal to those measured outdoors (0.5 ppm). If a flammable material (e.g., xylene) comes into contact with any ignition source, the vapor plume may result in ignition of the material in this container. The conditions of this container can also lead to the eventual drying of the storage liquid and exposure of sodium to the air, which is unacceptable for this material. Sodium metal is water reactive (NFPA, 1991) and is an extreme fire hazard. Located above the sodium cabinet is a skylight sealed with louvers (see Pictures 8 and 9) that are designed to expend pressure within the room in case of explosion from ignited chemicals. Outdoor light can be seen penetrating through the louver seams and damaged ceiling plaster exists below the roof vent, indicating rainwater penetration into the room in the past. Sodium metal must be stored in a manner to remove the possibility of contact with water.

- On the opposite side of the back wall of the cabinet containing the water reactive materials are stored acids (see Picture 10). Acids are diluted in water to reduce concentration. The caps for several of these containers are corroded, indicating acid

solution off-gassing into the cabinet. This potential water source should not be stored in close proximity to water reactive materials.

- The three metal storage cabinets are not flammable storage cabinets. The doors of these cabinets can allow air to pass into the cabinet interior to provide an oxygen source to support combustion. The shelves have begun to corrode from exposure to off-gassing chemicals (see Picture 11). A number of flammable VOCs (see Tables 22 through 24) are stored in these cabinets. Exposure to vapors of off-gassing chemicals can be irritating to the eyes, nose and respiratory system. In addition, flammable materials should be stored in a cabinet that meets the requirements of the National Fire Prevention Association (NFPA) (NFPA, 1996). With this breach, it would not be expected that this cabinet would perform to prevent fire spread to stored chemicals.
- Gas cylinders of hydrogen, ammonia and chlorine were found stored in a drawer above the "sodium in xylene" cabinet (see Picture 12). Under both industry regulations and good chemical storage practice standards, cylinders of compressed gas must be fixed to a wall or stand to prevent damage to cylinder valves by tipping (Rose, S. L., 1984). A damaged cylinder valve can cause an immediate and uncontrolled release of the cylinder contents and result in the cylinder becoming a projectile. These cylinders must be secured as soon as possible to prevent accidental release and injury.
- A container of a restricted use pesticide was stored in the metal cabinet nearest the door (see Picture 13). Malathion is an organophosphate pesticide. Malathion can be readily absorbed through the skin on contact and requires the use of personal protective equipment (PPE) (US EPA, 2000). For these reasons, the US

Environmental Protection Agency has classified this pesticide as a restricted use pesticide, which curtails the sale of this material to the general public and requires that the user of this material be a licensed restricted use pesticide applicator.

- Acids were stored in the wall-mounted wood unit cabinet. Acid containers were heavily coated with rust, indicating significant material degradation of metal cabinet components and/or metal containers in this cabinet. Corresponding damage was noted on cabinet latches and hinges. Substantial corrosion to the latches and shelf supports indicate that acids are off-gassing from containers. In order to prevent metal corrosion, acids should be stored in acid proof cabinets.
- A metal container below the refrigerator contains a bottle within a wooden box (see Picture 14). The product appears to have leaked from this container, which was reported as containing perchloroacetic acid by NQHS staff.
- The outer room contains containers of elemental mercury, stored on an open shelf (see Picture 15).
- The storeroom has two exhaust vents, one of which does not appear to draw air. Exhaust vents in chemical storage areas should operate 24 hours to remove chemical vapors.
- A container marked flammable is stored next to a radiator (see Picture 16)
- Many materials appear to be of extreme age.
- Labels on some containers have disintegrated.
- Chemicals in the storeroom are stored on shelves without any barriers/guardrails to prevent bottles from falling.

- One bottle was stopped with a stopper made of cork material. Cork is not an appropriate method for sealing VOCs.
- Shelves are crowded with chemical containers, so that container labels cannot be seen without moving bottles.
- There are a number of unlabeled containers filled with unknown materials.

Similar chemical storage conditions listed were noted in other sections of the science classrooms. These storage practices can also pose conditions that can influence indoor air quality within these rooms and in immediately adjacent classrooms.

It is highly recommended that a thorough inventory of chemicals in the science department be done to assess chemical storage and disposal in an appropriate manner consistent with Massachusetts hazardous waste laws.

Conclusions/Recommendations

In view of the findings at the time of the visit, the following recommendations are made:

1. Remove sodium metal from plastic container and place in a container that is VOC degradation resistant.
2. To maximize air exchange, the BEHA recommends that both supply and exhaust ventilation operate continuously during periods of school occupancy independent of classroom thermostat control.
3. Examine each univent for function. Survey classrooms for univent function to ascertain if an adequate air supply exists for each room. Operate fresh air supply univents while classrooms are occupied. Consider consulting a heating, ventilation

and air conditioning (HVAC) engineer concerning the calibration of univent fresh air control dampers school-wide.

4. Inspect exhaust motors and belts for proper function, repair and replace as necessary.
5. Remove all blockages from univents and exhaust vents.
6. Once both the fresh air supply and exhaust ventilation are functioning, the ventilation system should be balanced.
7. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
8. Replace any remaining water-stained ceiling tiles and wall plaster. Examine the area above and around these areas for mold growth. Disinfect areas of water leaks with an appropriate antimicrobial. Ceiling tiles should be removed at a time when occupants are not present in the area. Contain the area where ceiling tiles are removed to prevent the spread of dust and mold spores. This practice should be conducted routinely.
9. Move plants away from univents in classrooms. Examine drip pans for mold growth and disinfect areas of water leaks with an appropriate antimicrobial where necessary.
10. Consider having windows replaced or proper flashing installed to prevent further water intrusion. Repair water damaged windowsills, walls and wall-plaster. Examine these areas for mold growth. Disinfect areas of water leaks with an appropriate antimicrobial.

11. Store cleaning products properly and out of reach of students. Store flammables in a flameproof cabinet.
12. Replace missing ceiling tiles, to prevent the egress of dirt, dust and particulate matter into classrooms.
13. Remove pesticide from chemical storeroom and dispose of in a manner consistent with Massachusetts hazardous waste laws.
14. Have a chemical inventory done in all storage areas and classrooms. Properly store flammable materials in a manner consistent with the local fire code. Discard hazardous materials or empty containers of hazardous materials in a manner consistent with environmental statutes and regulations. Label chemical containers with the chemical name of its contents. Follow proper procedures for storing and securing hazardous materials.
15. Obtain Material Safety Data Sheets (MSDS) for chemicals from manufacturers or suppliers. Maintain these MSDS' and train individuals in the proper use, storage and protective measures for each material in a manner consistent with the Massachusetts Right-To-Know Law, M.G.L. c. 111F (MGL, 1983).
16. Do not use chemical hoods for storage. Operate chemical hood exhaust fans at all times that chemicals are present within this machinery.
17. Prohibit smoking in this building in accordance with Massachusetts law (M.G.L. Chapter 270, Sec. 22). If a designated smoking area is established in this building, provide local exhaust ventilation in accordance with ASHRAE ventilation standards (ASHRAE, 1989)

18. Relocate or consider reducing the amount of materials stored in classrooms/office areas to allow for more thorough cleaning. Clean items regularly with a wet cloth or sponge to prevent excessive dust build-up.
19. Clean chalkboards and trays regularly to avoid the build-up of excessive chalk dust.

References

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Picture 1

Classroom Univent Obstructed by Items on top of Air Diffuser and in Front of Univent Return

Picture 2

Plants on Top of Univent in Close Proximity to Air Diffusers, Also Note Plants on Top of Paper Towels

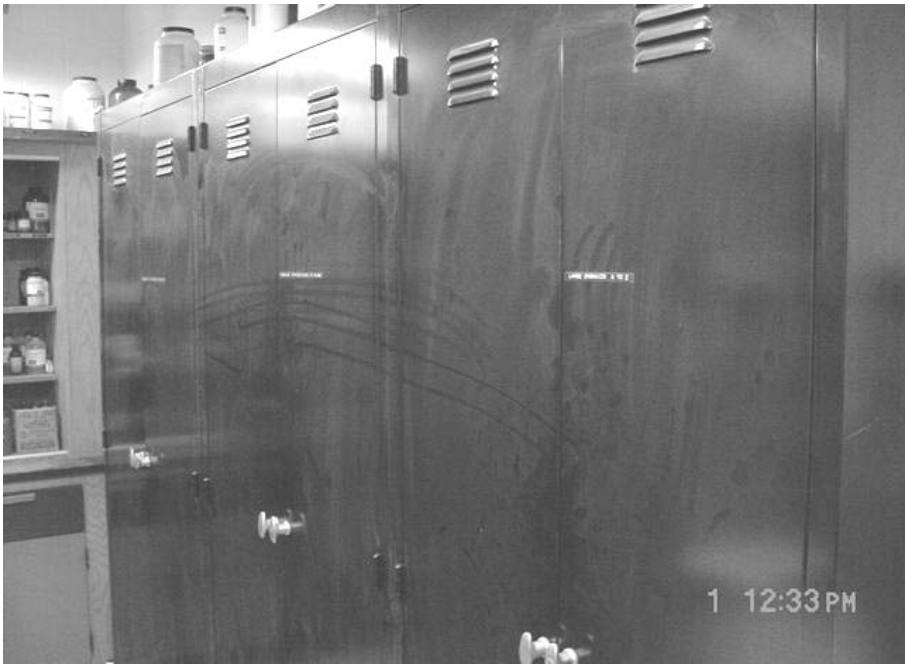
Picture 3

Accumulated Items in Science Storeroom

Picture 4

Accumulated Items in Science Office

Picture 5



Metal Storage Cabinets

Picture 6

Ethyl Ether on Door of Refrigerator in Storeroom

Picture 7

Container Labeled "Sodium in Xylene", Note Bulge in Lid

Picture 8

Pressure Relief Louver In Skylight Above Cabinet Containing Water Reactive Materials
Note Stain on Louvers and Damaged Plaster, Indicating Historic Water Leaks

Picture 9

Pressure Relief Louver In Skylight Above Cabinet Containing Water Reactive Materials View On Roof

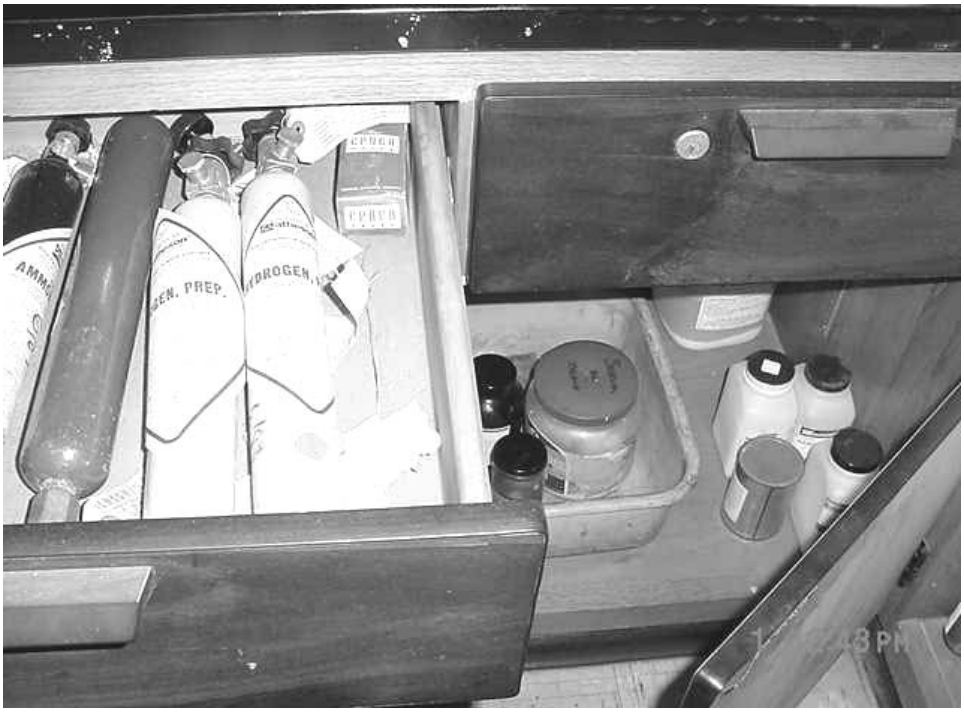
Picture 10

Acids Stored In Same Unit As Water Reactive Materials, Note Crystallization On Caps And Corrosion Of Metal Hinges

Picture 11

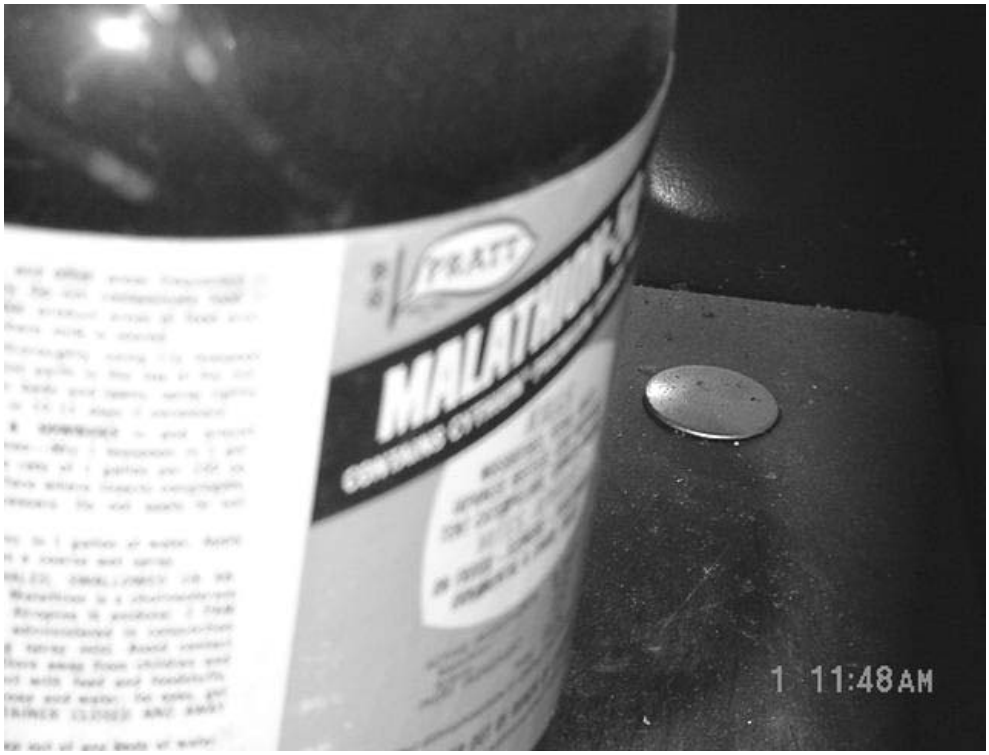
Corrosion of Metal Components of Cabinet, Note Heavy Coating Of Bottles with Rust Particles

Picture 12



Gas Cylinders Stored In Drawer Above “Sodium In Xylene” Container

Picture 13



Container of Malathion in Metal Cabinet Nearest Door

Picture 14

Metal Container below the Refrigerator Contains A Bottle within A Wooden Box Note Stain

Picture 15

Elemental Mercury in Jar near Sink

Picture 16

A Container Marked Flammable Is Stored Next To A Radiator, Note Flammable Label

TABLE 1

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Outside (Background)								
Room 403	947	77	34	~10	Yes	Yes	Yes	Univent off-return blocked by bookcase, window and door open, 24 computers
Boy's Restroom							Yes	
Room 402	1163	70	48	~14	Yes	Yes	Yes	Univent off, window and door open
Room 401	932	73	39	4	Yes	Yes	Yes	Univent off
Room 452	1126	73	39	~19	Yes	Yes	Yes	Univent off, window and door open, chalk dust
Room 451	950	73	35	0	Yes	Yes	Yes	Supply and exhaust off, window and 2 doors open, 22 computers
Room 450	995	74	35	15	Yes	Yes	Yes	Supply and exhaust off, window and 2 doors open, 25 computers
Room 449	959	73	34	21	Yes	Yes	Yes	Supply and exhaust off, 2 doors open, 25 computers
Room 448	1146	73	36	11	Yes	Yes	Yes	Window open, books on univent (on), exhaust off

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 2

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 419				0	Yes	*		*Univent inoperable-motor on order, bowed CTs, varied lab supplies, room vacant-reportedly being restored to science lab
Room 418	551	72	32	1	Yes	Yes	Yes	Bowed CTs
Room 417	820	71	33	19	Yes	Yes	Yes	Exhaust very weak/off, bowed CTs, door open
Faculty Room	888	72	34	1	No	Yes	Yes	3 computers, 2 doors open, accumulated items
Room 416	968	71	33	26	Yes	Yes	Yes	Supply off
Room 414	690	72	31	20	Yes	Yes	Yes	2 aquariums, 1 broken window
Room 413	575	74	29	-	Yes	Yes	Yes	**chemical storage in juice containers/in vent hood, broken window
Room 411	790	74	31	23	Yes	Yes	Yes	Chemical storage in vent hood
Room 410A	730	75	30	0	Yes	Yes	Yes	Light shield missing

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 3

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Closet 410B	730	75	30	0	No	Yes	Yes	Chemical storage
Room 410	763	74	30	25	Yes	Yes	Yes	Empty acid bottles beneath vent hood, window open
Room 408	757	73	30	19	Yes	Yes	Yes	Chemicals stored in vent hood-kerosene/lighter fluid/ acids, odors, window open
Room 407A (Storage)	631	74	29	0	No	Yes	Yes	Kerosene/acids/unlabeled materials with cork stoppers, chemical hood
Room 303	1292	75	34	18	Yes	Yes	Yes	Window and door open, supply off, bowed CTs (former leak), 17 computers
Room 302	900	76	31		Yes	Yes	Yes	2 doors open, univent off, 7 computers
Room 301	830	75	31	15	Yes	Yes	Yes	Univent off-plant on univent, door open
Room 346	1035	75	31	23	Yes	Yes	Yes	Window and 2 doors open, univent off, plant on windowsill near univent, personal fan, accumulated items

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

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	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 4

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 345	1175	75	32	25	Yes	Yes	Yes	Plants on univent – univent off, window and door open
Room 344A	1132	75	34	21	Yes	Yes	Yes	Supply and exhaust off, plants on univent, window and door open, water damage, chalk dust
Room 344	1181	74	33	16	Yes	Yes	Yes	Supply and exhaust off, door open
Room 343	911	74	31	0	Yes	Yes	Yes	Supply and exhaust off, water damage at window
Room 342	1188	74	32	20	Yes	Yes	Yes	Supply and exhaust off-books/items on univent, window open
Room 341	1048	73	32	13	Yes	Yes	Yes	Supply and exhaust off, window open, carpet
Room 339/340	985	74	32	12	Yes	Yes	Yes	Supply and exhaust off, window open, carpet, accumulated items on univent
Room 338	1520	72	35	12	Yes	Yes	Yes	Supply and exhaust off, window open, accumulated items on univent
Room 307	901	73	32	20	Yes	Yes	Yes	Window and door open

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 5

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 308	735	72	31	18	Yes	Yes	Yes	Window and door open
Room 309	813	73	32	11	Yes	Yes	Yes	Door open
Room 310	675	73	31	20	Yes	Yes	Yes	Reported occasional odors from nearby gas station in early am
Room 311	628	72	30	14	Yes	Yes	Yes	Window and door open, room partition open slightly
Room 312 (Office)	615	72	30	0	No	Yes	Yes	Chalk dust, partition open
Room 312B	630	72	30	12	Yes	Yes	Yes	Painted masks
Room 226B	845	70	35	1				Carpet
Room 229A/B/C (Library)	613	71	32	0	No	Yes	Yes	Carpet
Room 231 (Library)	599	71	32	0	No	Yes	Yes	Carpet
Library Stacks (229)	620	71	32	0	No	Yes	Yes	
Library Reading Area	639	71	31	0	No	Yes	Yes	5 computers

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 6

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Library (230)	593	71	31	0	No	Yes	Yes	
229E Media	626	71	31	1	No			
229D Stockroom				0	No	Yes	Yes	
Auditorium	473	70	30	0	No	Yes	Yes	Right wall-previous leak
Room 313 (Faculty Lounge)	603	72	31	0	No	Yes	Yes	
Room 315 (Office)	684	72	30	1	Yes	Yes	Yes	
Room 224	746	72	32	0	No	Yes	Yes	Perfume odors
Room 224B	906	73	33	20	No	Yes	Yes	
Room 224C	760	72	32	1	No	Yes	Yes	20 occupants gone ~20 mins.
Room 225	828	72	32	13	No	Yes	Yes	Door open
Room 226E (Dark Room)	800	71	32	0	No	Yes	Yes	

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 7

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 226 (Photography)	770	71	33	0	No	Yes	Yes	Skylight
Room 226 (Art Room)	745	70	34	6	Yes	Yes	Yes	Solvents/laquers not in flammables cabinet
Kiln Room				0	Yes			Broken window, odors, exhaust ducted in wall
Art Storeroom					Yes			Flammables-spray paint/varnishes, accumulated items
Math – Room 404A	1084	75	37	16	Yes	Yes	Yes	Univent off-reported motor missing, 8 plants-no drip pans, carpet, chalk dust, door open
Room 404B	1394	73	40		Yes	Yes	No	Univent off, window and door open, air conditioner, chalk dust, carpet-some stains
Room 405	1043	74	36		No	Yes	Yes	~14 computers, door open
Room 435	1191	77	33	15	No	Yes	Yes	Carpet, 2 floor fans, dry erase board, cleaning product, accumulated items, door open
Room 436	745	73	30	0	Yes	Yes	Yes	Water damage at windows, door open

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 8

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 437	715	74	30	0	Yes	Yes	Yes	Supply and exhaust off, water damage at windows, refrigerator
Room 438	789	76	32	10	Yes	Yes	Yes	Exhaust off, water damage at windows, door open (to 439)
Room 439	777	74	31	0	Yes	Yes	Yes	Univent off (operable), exhaust off, water damage at windows, 2 doors open
Room 440 (Faculty Lounge)	715	71	30	0	Yes	No	Yes	Exhaust off, water damage around windows, stove/fridge/sink combo
Room 424	1067	73	35	18	No	Yes	Yes	Chalk dust, cleaning product, floor fan, door open, 2 sinks (not used)
Room 424A	829	74	33	0	No	Yes	Yes	2 sinks, plant-with drip pan, floor fan, door open, 2 refrigerators, beetle experiment/rotting fruit
Room 425	990	74	34	18	No	Yes	Yes	13 aquariums, door open, stained CT, 3 sinks, floor fan, cleaning product
Room 425A	851	74	33	0	No	Yes	Yes	2 sinks
Room 426	946	73	34	22	No	Yes	Yes	Chalk dust, dry erase board, refrigerator, sink, floor drain

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 9

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 427	1184	73	36	24	No	Yes	Yes	Chalk dust, sink, 2 personal fans
Room 427A (lab)	1075	73	34	0	No	Yes	Yes	Wall crack, cleaning product, sink, ajar CT, personal fan, motor oil, adhesives
Room 428	1168	73	34		No	Yes	Yes	23 occupants gone <5 mins., aquarium, 3 sinks
Girl's Restroom (near cafeteria)							Yes	Floor drain, door open
Boy's Restroom (near cafeteria)							Yes	Exhaust weak, floor drain
Cafeteria	793	72	34	250-300		Yes	Yes	2 exterior doors, doors to hallways open, ajar CT
122A - (teacher's lunch lounge)	547	69	35	7	Yes	Yes		Supply weak, floor fan, space under exterior door
Room 429	1026	73	34	22	No	Yes	Yes	Water damaged CT, plants (with drip pans), growth chamber, potting soil, floor fan, 3 sinks, chalk dust, logs, wasp nest, anatomy items

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 10

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 304	1187	76	31	13	Yes	Yes	Yes	Carpet, water damage around windows, door open, univent off-debris inside
Room 304B	1047	73	31	15	Yes	Yes	Yes	Univent off, window and door open, carpet, dry erase board, chalk dust
Room 305	897	77	31	2	No	Yes	Yes	Dry erase board, chalk dust
Room 324	1240	77	33	20	No	Yes	Yes	Chalk dust, carpet, dry erase board
Room 325	1076	76	31	1	No	Yes	Yes	Items on univent, dry erase board, accumulated items
Room 330	748	72	29	0	Yes	Yes	Yes	Supply and exhaust off, door open, chalk dust
Room 331	697	71	30	0	Yes	Yes	Yes	Supply and exhaust off, door open, chalk dust
Room 332				0	Yes			Window open, recyclables in cardboard box, carpet
Room 333	1420	73	36	18	Yes	Yes	Yes	Supply and exhaust off, items on univent, chalk dust

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 11

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 334 (Foreign Language Office)	707	74	31	3	Yes	Yes	Yes	Exhaust off, items on univent-return blocked, carpet, accumulated items
Room 336	555	71	29	0	Yes	Yes	Yes	Supply and exhaust off, carpet
Room 337	1368	71	34	9	Yes	Yes	Yes	Supply and exhaust off, door open, chalk dust, carpet
Girl's Restroom (math department)				0	Yes		Yes	Passive door vent, cigarette odors-ashes/debris on heater, air freshener odor
Room 320	848	74	32	19	No	Yes	Yes	Personal fan-on, broken CT, utility holes, sink
Room 319	687	73	30	0	No	Yes	Yes	5 computers
Women's Restroom (SS wing)							Yes	Exhaust weak, cigarette odors, passive door vent, door open
Men's Restroom (SS wing)							Yes	Door vent sealed, smoke odors
Room 316C	1200	72	33	14	Yes	Yes	Yes	Water damaged CT, chalk dust, carpet, 1 out of 2 exhaust vents off
Room 316B	1365	72	34	13	Yes	Yes	Yes	Exhaust weak, univent blocked, carpet, chalk dust

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 12

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 316A	1373	73	35	19	Yes	Yes	Yes	Exhaust weak, items on univent, carpet
Room 316E	1260	73	35	11	Yes	Yes	Yes	Exhaust weak, ajar CT, carpet
Room 316D	1015	73	33	0	No	Yes	Yes	Carpet, accumulated items
Room 223	824	72	31	19	Yes	Yes	Yes	Carpet
Room 220C	789	73	31	21	Yes	Yes	Yes	Carpet
Room 220A	761	72	30	17	Yes	Yes	Yes	Hole in carpet-exposed mastic
Room 220B	682	72	30	0	Yes	Yes	Yes	Carpet
Room 221B	694	72	31	0	No	Yes	Yes	
Room 222 (lounge)	784	73	32	2	No	Yes	Yes	Stove/fridge/sink combo, carpet, dry erase board
Room 219	740	72	30	18	Yes	Yes	Yes	Carpet
Room 218	1091	74	31	15	Yes	Yes	Yes	Carpet, bowed CTs

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 13

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 217	816	73	31	13	Yes	Yes	Yes	Worn carpet at teacher's desk, personal fan
Room 201	514	71	29	0	Yes	Yes	Yes	Supply off, carpet
Room 202	1095	73	34	~15	Yes	Yes	Yes	Univent off-items on top, carpet, chalk dust
Room 234	830	73	32	0	No	Yes	Yes	
Room 233	830	75	33	1	No	Yes	Yes	Supply weak, personal fan
Room 203 (Dean's Office)	833	75	32	1	Yes	No	No	Carpet, door open
Room 203 (outer office)	857	74	32	1	No	Yes	Yes	Exhaust weak, carpet, door open
Room 204 (outer office)	914	75	32	3	No	Yes	Yes	Carpet
Room 204 (Dean's Office)	1092	75	32	2	Yes	No	No	Carpet, perfume odor
Room 205 (outer office)	804	75	31	2	No	Yes	Yes	Photocopier, carpet

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 14

Indoor Air Test Results – North Quincy High School, Quincy, MA – January 30, 2002

Location	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Room 206B	799	74	30	0	Yes	No	No	Wall mounted air conditioner-dirty filter, water cooler on carpet, 6 plants
Room 206A	650	73	29	0	Yes	No	No	6 plants, carpet
Room 207 (outer office)	854	74	32	5	No	Yes	Yes	Supply weak, carpet
Room 207A	826	74	31	0	No	Yes	Yes	Carpet, door open, personal fan, accumulated items
Room 207F	846	74	31	1	No	Yes	Yes	Carpet
Room 210	940	75	32	1	No	Yes	Yes	Exhaust off-backdraft, carpet, door open, personal fan
Room 212	989	75	31	2	No	Yes	Yes	

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 15

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Outside (Background)								
Room 452	1190	70	40	17	Yes	Yes	Yes	Window open
Room 450	1574	71	37	14	Yes		Yes	Doors open
Room 439	898	70	33	6	Yes		Yes	Door open – to next room
Room 448	1138	70	35	9	Yes		Yes	Exhaust weak
Room 441	787	70	33	1	Yes	Yes	Yes	Univent off, exhaust weak, 24 computers, doors open to room 442
Room 442	811	69	33	0	Yes	Yes	Yes	Univent off-operable, carpet-worn
Room 443	867	70	33	0	Yes	Yes	Yes	Exhaust weak, 1 computer, stained carpet
Room 444	790	69	34	0	Yes	Yes	Yes	22 computers, univent off-operable, stained carpet, odors-paint/permanent marker

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 16

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Room 327	1252	72	36	19	Yes	Yes	Yes	Supply off
Room 329	1077	72	34	5	Yes	Yes	Yes	Univents off, exhaust weak, door open, items on univent
Room 330	1123	71	34	15	Yes	Yes	Ys	Supply off-by switch, exhaust weak, door open, items on univent
Dean's Office	766	71	32	0	Yes	No	No	Air conditioner-clean filter
Room 247E (storeroom)	889	75	33	0	No	Yes	Yes	
Room 247 (main office)	766	75	32	6	No			
Athletic Office (125 inner)	752	71	33	0	No	Yes	No	
Athletic Office	759	70	33	2	No	Yes	Yes	Door open, refrigerator, water cooler, photocopier, personal fan
Locker Room (Bathroom Area)				0	No	No	Yes (2)	Floor drains
Locker Room (Lockers)				0	No	Yes (2)	Yes	Floor drains, water damaged CT, wall/floor cracks, supply weak`

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 17

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Locker Room-part 1				0	No	Yes (4)	Yes (8)	Floor drains
Locker Room-part 2				0	No	Yes (2)	Yes (4)	Floor drains, door open, 2 floor fans
Athletic Lockers	560	71	29	0	No	Yes	Yes	Supply off, 2 missing CT, gym odors, scented candles
Special Ed.	524	69	31	0	Yes	Yes	Yes	Univent off-blocked, exhaust weak, personal fan, air freshener odor
School Store	1134	71	40	~35	Yes	Yes (2)	Yes	Personal fan, refrigerator, doors open, 3 water damaged CT, supply off
Ladies Restroom				2	Yes		Yes	Door vent, floor drains, cigarette odors

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 18

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Room 103	945	71	35	21	Yes	Yes	Yes	2 air conditioners, air purifier, bowed CT, items on univent, aquarium/frog, exterior door, carpet, kitchenette, cleaning products (out of children's reach), 5 water damaged CT, refrigerator, bathroom, wall fans, accumulated items
Room 331	1236	73	34	5	Yes	Yes	Yes	Exhaust weak, door open
Room 333	1240	73	35	12	Yes	Yes	Yes	Univent - off
Room 337	993	72	33	1	Yes	Yes	Yes	Carpet, chalk dust
Room 139 (Choir Room)	2535	72	40	44	Yes	Yes	Yes	Univent off/blocked, exhaust off, wood stains, dry erase board, chalk dust, accumulated items
Drama Office	917	73	31	6	No	No	No	
Black Box	490	71	30	0	No	Yes	Yes	Odors, space under door-leading to wood area

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 19

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Exit - Near Stairwell 10					No			Cigarette smoke odors – butts outside door
Band Room	551	67		2	No	Yes	Yes	Missing CT, personal fan, stained carpet, exterior doors
Band Room Office	535	74	31	0	No	Yes	Yes	Exhaust weak, carpet
Practice Room #3	560	73	31	0	No	Yes	Yes	Supply weak, carpet
Room 433	1000	73	34	4	Yes	Yes	Yes	
Room 432	798	75	32	0	No	Yes	Yes	
Room 344A	1115	72	37	17	Yes	Yes	Yes	Door open
Room 344	1511	72	38	19	Yes	Yes	Yes	Door open, univent off
Room 343 (Office)	800	72	32	1	Yes	Yes	Yes	
Room 342	1581	72	37	42	Yes	Yes	Yes	Window open, univent off

*** ppm = parts per million parts of air**
CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 20

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Woodshop	618	69	33	4	Yes	Yes	Yes	Space under exterior door, door open, door broken-to be addressed
Room 136 (Drafting)	825	70	35	3	Yes	Yes	Yes	Exhaust weak
Room 135 (Patient Care)	436	67	35	0	Yes	Yes	Yes	
Gym	489	68	34	15	Yes	Yes	Yes	
Weight Room	529	66	34	2	Yes		Yes	Unient inoperable, door open
Boy's Locker Room	440	65	36	3	No	Yes	Yes	
Shower Area							Yes	Exhaust off/very wewak
Room 101 (Dance Studio)	474	66	33	0	Yes	Yes	Yes	10+ water damaged CT, items on univent, room used after school
Room 107A	826	70	38	1	No	Yes	Yes	
Room 107	843	73	38	0	No	Yes	Yes	

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 21

Indoor Air Test Results – North Quincy High School, Quincy, MA – February 1, 2002

Athletic Office **Location**	**Carbon Dioxide *ppm**	**Temp. °F**	**Relative Humidity %**	**Occupants in Room**	**Windows Openable**	**Ventilation**		**Remarks**
						Intake	**Exhaust**	
Room 106	975	75	36	15	No	Yes	Yes	Door open
Room 104	829	69	31	16	Yes	Yes	Yes	Univent off-items on top and in front of return
Room 105	780	69	32	1	Yes	Yes	Yes	
Perimeter Notes								Moss growth, black stains under windows (english dept.), plant growth in crack by shop stairway

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CT = ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

Table 22
Metal Cabinet Nearest Door

Chemical	Quantity	Flammable
phthalic anhydride	1 1-lb bottle	
phenyl salicylate	1 100-gm bottle	
phenyl hydrazine		
p-dichlorobenzene	3 3-kg bottle	
polyvinyl alcohol 90 % hydrolyzed	2 bottles	yes
polyisobutylene in decolyn	1 bottle	
proprionic acid	1 1-kg-bottle	
n-propyl alcohol	3 500-ml bottles	yes
pyrogallic acid	1 bottle, 1 1-lb bottle, 5 1-ounce bottles, 1 125-gms bottle	
pyridine	1 pint	yes
quinalizarine	1 50 gm bottle	
resorcinol	1 bottle	
salycilic acid	4 1-lb bottles	
phenyl salycilate	1 4-once bottle	
stearic acid	1 500-gm bottle	
tannic acid	2 1-lb. bottle	
tannic acid, technical	1 bottle	
urea	1 1-lb bottle	
tartaric acid	1 500-gm bottle	
thiourea	1 1-lb bottle	
1,1,1-trichloro-2-propanol	1 bottle	yes
toluene	3 1-pint bottle, 1 8-pint bottle	yes
triethanolamine	1 bottle	
thioacetamide	1 bottle	
2,4,6-trimethylpyridimine	1 100-gm	
turpentine, pure gum	2 bottle	yes
triethanolamine	1 ¼-lb bottle	
methyl alcohol	1 8-pint bottle	yes
xylene	1 1-gallon bottle	yes
malathion 50	1 large bottle	

Table 23
Middle Metal Cabinet

Chemical	Quantity	Flammable
ethylene glycol	10 1-pint bottles	
formaldehyde	1 bottle	
fumaric acid, 99%	1 500-gm bottle	
furfural	1 bottle	
formaldehyde, 40%	1 bottle	
hexamethylene tetramine	1 500-gm bottle	
hydroquinone	2 1-lb bottle	
hydroxylamine hydrochloride	1 bottle	
iodoform	1 ¼-lb bottle	
lactic acid	1 1-pint bottle	
methyl methacrylate monomer	1 500gm bottle	yes
nitrobenzene	1 1-lb bottle	yes
naphthnol	1 1-lb bottle 1 4-oz. bottle	yes
oxalic acid	Numerous bottles	
naphthalene	1 1-lb bottle	yes
phenol, crystallized	4 bottles	yes
toluene	1 1-qt bottle	yes
methyl isobutyl ketone	1 bottle	yes
xylene	1 4-liter bottle	yes
propanol	1 4-liter bottle	yes
methanol	1 8-qt. bottle	yes
ethanol	1 8-qt. bottle	yes

Table 24
Metal Cabinet Farthest from Door

Chemical	Quantity	Flammable
acetic anhydride	1 bottle	
glacial acetic acid	1 1-pint bottle	
acetone	1 4-liter bottle	yes
alcohol, denatured	1 metal can	yes
isoamyl alcohol	6 1-pint bottles	yes
amyl acetate, technical	1 1-lb bottle	yes
amyl alcohol	5 1-pint bottle	yes
cyclohexane	1 100-ml bottle	yes
petroleum ether	1 1-liter bottle	yes
aniline	8 bottles	yes
aniline hydrochloride	1 500-gm bottle	
benzyl aldehyde	1 1-pint bottle	yes
benzene	1 1-pint bottle	yes
benzaldehyde	1 1-pint bottle	yes
bromobenzene	1 1-pint bottle	yes
benzyl alcohol	2 1-pint bottle	yes
beta-naphthanol	1 bottle	yes
butyl alcohol	multiple bottles	yes
1-butanol	1 1-pint	yes
chlorobenzene	1 1-pint bottle	yes
chloroform	1 bottle, 1 1-pint bottle	
carbon tetrachloride	2 1-pint bottle, 1 bottle	
chlorobenzene	2 1-kg bottles	yes
cyclohexane	1 500-gm bottle, 1 bottle, 2 1-pint bottle	yes
diglycol stearate	1 bottle	
cresylic acid, crude	1 1-pint bottle	yes
cyclohexanol	1 1-pint bottle	yes
cyclohexanone	1 500gm bottle	yes
collodion	1 1-pint bottle	
p-dichlorobenzene	1 1-kg bottle	
dimethylsulphoxide	1 bottle	
1,2-dichloroethane	1 1-kg bottle	
ethyl alcohol, 95%	1 bottle	yes
n-butanol	1 4-liter bottle	yes
acetone	1 5-lter bottle	yes
amylic alcohol	1 bottle	yes
2-butanone	1 bottle	yes
alcohol	1 bottle	yes
alcohol with ethyl naphtha	1 bottle	yes
alcohol	1 bottle	yes
t-butyl alcohol	1 5-pint bottle	yes

Table 25
Wood Wall Mounted Unit, Section Labeled "Sodium Chloride"
Interior Severely Corroded

Chemical	Quantity	Flammable
nitric acid	Several bottles, broken caps	

Table 26
Wood Wall Mounted Unit
Low Cabinet

Chemical	Quantity	Flammable
denatured alcohol	1 1-gal bottle	yes
carbon tetrachloride	5 ~5-gallon bottles	
Benzene	1 ~5-gallon bottles	yes
methanol (labeled "wood alcohol")	1 metal can	yes

Table 27
Free Standing Wooden Unit
Drawer above Sodium Metal Container Cabinet

Chemical	Quantity	Flammable
Hydrogen	2 gas cylinders	yes
Ammonia	1 gas cylinders	
Chlorine	2 gas cylinders	

Table 28
Free Standing Wooden Unit
Cabinet* Containing Sodium Metal Container

Chemical	Quantity	Flammable
Sodium in xylene	~½ lb. in food jar	yes
formaldehyde solution	1 bottle	
potassium metal	50 gm	yes, in water

*128 ppm TVOCs measured in cabinet

Table 29
Container in Metal Box below Refrigerator

Chemical	Quantity	Flammable
perchoroacetic acid in metal cabinet	1 bottle, undetermined quantity	

Table 30
Total Volatile Organic Compunds (TVOCs)

Location	TVOCs (*ppm)
Outside (background)	0.5
Hallway Outside of Chem Storeroom	0.5
Center of Chem Storeroom	0.5
Inside Chem Cabinet	128

* ppm = parts per million of air